

## **About Space Operations**

• The Space Operations Mission Directorate (SOMD) directs spaceflight operations, such as space launches and integrated systems in low Earth orbit and beyond, including the International Space Station. SOMD enables other Agency missions by acquiring launch services, providing space communications and navigation services, and testing rocket engines. The International Space Station serves as a foundation for human lunar outposts and human missions to Mars by providing vital scientific and engineering information that will lead to more capable and safer future systems for human explorers.

## We enable NASA missions



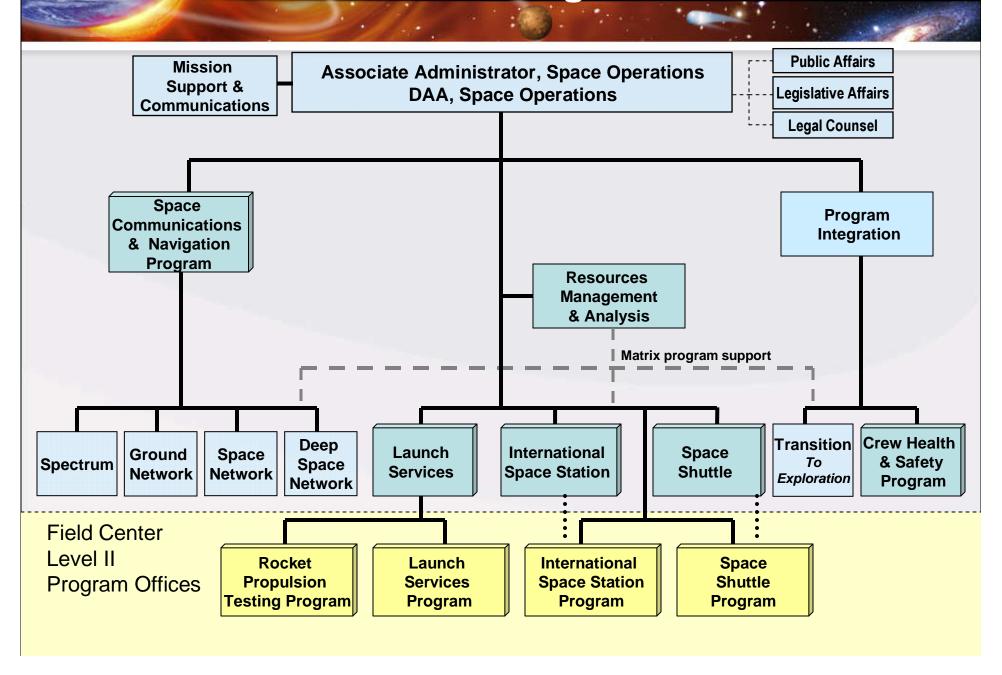
## **Current Projects and Initiatives**

## **Key Challenges**

- Completing assembly of the International Space Station
- Utilizing, operating and sustaining the International Space Station
- Acquiring commercial space launches; mixed fleet and emerging players
- Pursuing an integrated space communications architecture
- Transitioning from Shuttle to future space transportation systems

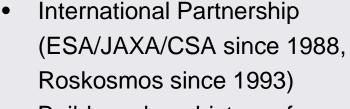


## **SOMD Organization Structure**



## **International Space Station**





- Builds on long history of international cooperation
- Largest spacecraft ever built
  - 420,500 kg at completion
  - Over 40 assembly flights
- Continuous human presence for 8 years (since Expedition 1 in Nov 2000)
  - Currently 3 crew
  - Up to 6 crew in 2009
- International crew
- International launch fleet
- Globally distributed operations















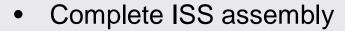






## International Space Station





- Provide logistics to operate and maintain the ISS
- Perform research
- Serve as operations testbed for future Exploration missions







## **Space Shuttle Overview**

- World's first reusable heavy-lift spacecraft with many unique capabilities
- 100 mission design life for each orbiter - 120 missions to-date

To complete the Shuttle's mission:

- 9 flights to the ISS
- 1 HST servicing mission
- The Space Shuttle will be retired in 2010
  - Shuttle retirement is not about going out of business. Rather, it is about transitioning to a new way of doing business.
- •Retirement is a combination of transfer and close-out activities. It is big, complex, uncharted, and emotional
  - Shuttle occupies 640 facilities, employees 15,000 people, and has
    900,000 line items of associated equipment with total assets valued near \$18B

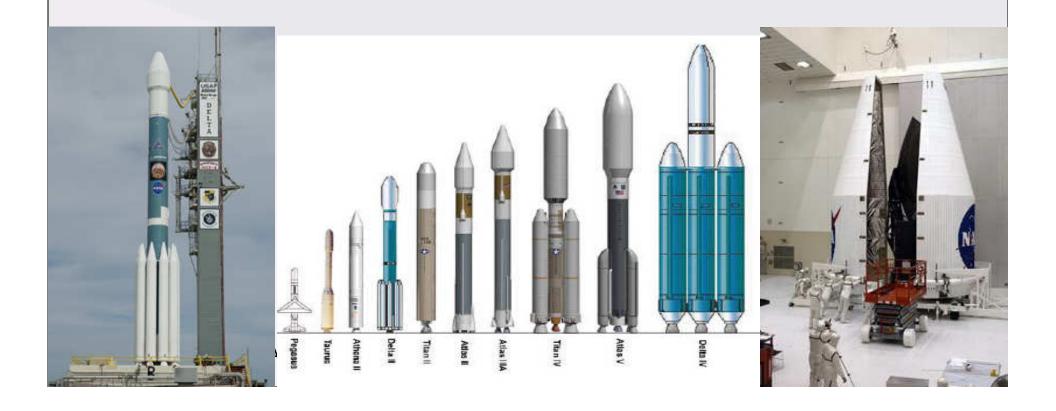




The highest Shuttle Program priority is safe and effective mission fly-out

## Launch Services Program

- Acquisition of ELV commercial launch services
- Perform mission assurance activities to maximize successful delivery of spacecraft to space
- Mission analysis and integration
- Encouraging emerging launch service providers

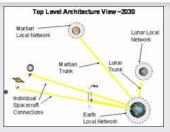


## **Rocket Propulsion Test Program**

- Develop & maintain propulsion test facilities at NASA centers "right sized" for current agency mission
- Increase DoD/NASA collaboration
- Increase technical collaboration between RPT centers
  - Cross-training to develop workforce
  - Cross- Utilization of equipment and workforce
  - Common standards and specifications
- Increase understanding of facility maintenance & operations requirements



## **Space Communications and Navigation**



### **Systems Planning**

- Architecture
- Data Standards
- Search & Rescue
- Technology



### **Deep Space Network**

- Global tracking stations to provide tracking, telemetry & commanding and navigation data for spacecraft beyond LEO
- Solar System Radar to determine orbits of Near Earth Objects



#### **Space Network**

- Space Network operations & maintenance
- Network Sustaining Engineering
- Network Upgrades



# Space Communications Integration Program

- Constellation Program Integration
- CEV to ISS Comm capability
- Constellation Lunar Comm capability and upgrades



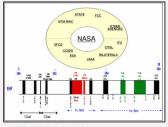
# Tracking & Data Relay Satellite System

Procuring two replacement satellites



# Near Earth Network (Ground Network)

- Global tracking stations to support near Earth space craft
- Provide tracking, telemetry and commanding to support mission operations



### **Spectrum Management**



## 2008 SOMD SBIR Subtopics

#### **Topic O1 – Space Communications**

- O1.01 Coding, Modulation, and Compression
- O1.02 Antenna Technology
- O1.03 Reconfigurable/Reprogrammable Communications Systems
- O1.04 Miniaturized Digital EVA Radio
- O1.05 Communication for Space-Based Range
- O1.06 Long Range Optical Telecommunications
- O1.07 Long Range Space RF Telecommunications
- O1.08 Lunar Surface Communication Networks and Orbit Access Links
- O1.9 Software for Space Communications Infrastructure Operations

#### **Topic O2 – Space Transportation**

- O2.01 Automated Collection and Transfer of Launch Range Surveillance/Intrusion Data
- O2.02 Ground Test Facility Instrumentations

#### **Topic O3 – Processing & Operations**

- O3.01 Crew Health and Safety Including Medical Operations
- O3.02 Human Interface Systems and Technologies for Spacesuits
- O3.03 Vehicle Integration and Ground Processing

#### **Topic O4 – Navigation**

- O4.01 Metric Tracking of Launch Vehicles
- O4.02 Precision Spacecraft Navigation and Tracking
- O4.03 Lunar Surface Navigation
- O4.04 Timing



# **Future Projects**

See ESMD/SOMD Integrated Acquisition Roadmap at

http://www.nasa.gov/mission\_pages/transition/home/index.html



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